



A HIGH DENSITY ENVIRONMENT

BY

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Dear Dean Anderson:

In partial fulfillment of the requirements
for the degree of Master of Architecture, I hereby
submit this thesis entitled,

"A High Density Environment".

Respectfully,

Zoser F. Fahmy

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I would like to express my gratitude to the following people whose guidance, criticism and devotion have been most valuable in the development of this thesis.

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ABSTRACT

The city is a living organism. It consists of a number of vital, functionally differentiated parts. The core of the city acts as the container for these essential organic parts. There is found the ~~Met~~atal and diversified elements that provide ~~servi~~ess and support for the population, act as the center of exchange of goods and ideas, and connect the leaders of business and financial productivity, thus assuring the economic growth of the city.

Like any organism, the city contains a heart. This most essential part should pulsate day and night. It acts as the origin and destination of the major transportation devices. This constant flow of goods and people makes it the most vital function in the city. The governmental, administrative and educational facilities preserve control and guidance over the city performing the same protective function as the computers of the brain.

The body is made of a skeletal structural frame covered with muscles and tissues that breath and react to the surrounding environment. Also, the city should be made of a growing, semi-permanent framework of elements, transportation lines, and city functions, that

are to structure the whole organism. Its ever-changing tissue of dwellings and supporting service systems change as its sociological and technological environment affects it. These outside stimuli can be traced to the people of the city, its life's blood, and thus the organism of the city can be treated as a largely self-contained body in a constant state of evolution as it accommodates internal stresses and environmental pressures.

STATEMENTS AND OBJECTIVES

The main purpose for planning of Germantown is to provide the whole region with services, recreational and educational facilities, and employment opportunities to satisfy the need of the fast-growing population in the area.

The new city is going to be the focal point of the region.

As well as the regional center, it is planned to serve and house 100,000 people. This population mainly consists of high income people who would be moving out of Washington D. C.

Therefore, quality and diverse ways of living are some of the specifications for this particular housing problem.

The plan is to start with a large portion of the city that would accommodate 30,000 people as well as most of the regional facilities. Then it grows to accommodate 100,000 people by the year 2000.

In order to satisfy the needs as it grows, the erection of different parts in different locations should start simultaneously and independently, and each in its own direction to meet as planned.

What is a luxury today is a necessity in the future.

The inability of today's technology is going to vanish tomorrow.

Cost determined by need, duration, adaptability, the technical ability, as well as some other factors.

Prefabrication are tools and instruments to compose and orchestrate beautiful cities. Prefabrication should not be a limitation or a restriction but a means to a result.

Prefabricated items could be as small as a brick or as large as a complete dwelling unit. Not only the economic aspect of producing but also quality and time involved are the standards.

Some elements should be rigid, hard and strong to hold and tie the whole as one such as road network service roads and parking and public cores. They should satisfy their functional requirements. They should be engineered to the ultimate usage.

Dwelling units wear out and die, and grow or multiply. Adaptability, flexibility and ability to be replaced or removed are required qualities for these dwelling tissues. At the same time, at all times, the whole should read as uninterrupted and unmended one.

The inside of the dwelling matrix should provide for a variety of ways of living and the outer skin should be complementing, taking best advantages of and being affected by the surroundings.

The individual dwelling should contribute an intimate social and physical contact to the group.

Also, services, community facilities and recreational and educational facilities grow and change.

Therefore, these local services and facilities should not be restricted to an area or to any particular outline.

Also, there should be the freedom or the opportunity to be able to have objects like churches, theaters, stadiums, swimming pools, and others as well as groups of shops, cafeterias, cafes and restaurants.

1. Assumptions for the expected growth of Germantown with respect to population, dwellings and jobs.

Population growth predominantly by immigration in early stages and thereafter by natural growth and immigration until town reaches 85,000-100,000 people.

| <u>Year</u> | <u>Population</u> | <u>Dwellings</u> | <u>Jobs</u> |
|-------------|-------------------|------------------|-------------|
| 1965 | -- | -- | -- |
| 1970 | 15,000 | 4,300 | 5,000 |
| 1975 | 30,000 | 8,600 | 10,000 |
| 1980 | 45,000 | 12,900 | 15,000 |
| 1985 | 60,000 | 17,200 | 20,000 |
| 1990 | 75,000 | 23,800 | 20,000 |
| 1995 | 87,500 | 28,000 | 27,000 |
| 2000 | 100,000 | 32,000 | 30,000 |

2. Schedule of accommodation for 30,000 population attainable in 1975

Approximately 8,600 dwellings. In the breakdown of this figure with respect to type of dwellings, size and number, rely on data given in tables I through V.

4 elementary schools, 175-300 children
1 junior high school, 1000-1500 children
1 high school, 1000-1500 children
1 community college
1 technical institute
1 library
1 museum - art gallery
1 auditorium-assembly hall to seat 2000
1 theater
3 cinemas
5 multipurpose halls
places of worship
3 gymnasiums
2 covered swimming pools
bowling alley
500 hotel rooms
restaurants
cafes
clubs, facilities for dancing, etc.
open air sport and recreational facilities
open spaces
parks
lakes
250,000 sq.ft. of local shopping centers
1,000,000 sq.ft. regional shopping center
city hall and
city administrative offices, court house
medical center with 500 bed hospital
2 health centers (clinics, nursing homes)

fire station
police station
jail

750,000 sq.ft. of office space for federal and state
government offices and private enterprise of wholesale
and manufacturing organizations, banking and insurance
150,000 sq.ft. of floor space for research laboratories
1,000,000 sq.ft. of floor space for electronic and
other light industries and warehouses

The quantitative program for the period of 10 years to some extent
could be used as a "yardstick" for further development.

However, as it is more difficult to predict as we go further into
the future, you should think in terms of general direction for the
further development of the city, considering alternatives with a
higher degree of detail for the earlier periods.

SELECTED SOCIO-ECONOMIC CHARACTERISTICS OF WASHINGTON D.C. (WA) AND
MONTGOMERY COUNTY MD. (MO) (1960)

data source: Census Tracts, Washington D.C. - Md. - Va., Censuses of
Housing and Population 1960, U. S. Bureau of the Census

| I. racial and ethnic characteristics | <u>WA</u> | <u>MO</u> |
|---|-----------|-----------|
| total population | 763956 | 340928 |
| % of total population: | | |
| Negro | 53.90 | 3.38 |
| other races | 0.91 | 4.88 |
| born in Puerto Rico | 0.13 | 1.03 |
| foreign born | 5.09 | 4.53 |
| II. age distribution, % of total population | | |
| male | | |
| under 5 years | 5.13 | 6.32 |
| 5-9 | 4.15 | 6.42 |
| 10-14 | 3.37 | 5.42 |
| 15-19 | 3.00 | 3.29 |
| 20-24 | 3.70 | 1.94 |
| 25-29 | 3.78 | 2.55 |
| 30-34 | 3.48 | 3.62 |
| 35-39 | 3.40 | 4.29 |
| 40-44 | 3.02 | 4.06 |
| 45-49 | 3.05 | 3.37 |
| 50-54 | 2.87 | 2.58 |
| 55-59 | 2.48 | 1.74 |
| 60-64 | 1.97 | 1.25 |
| 65-69 | 1.52 | 0.89 |
| 70-74 | 0.99 | 0.57 |
| 75-79 | 0.59 | 0.34 |
| 80-84 | 0.30 | 0.17 |
| 85 years and over | 0.17 | 0.11 |
| female | | |
| under 5 years | 5.08 | 6.08 |
| 5-9 | 4.14 | 6.29 |
| 10-14 | 3.48 | 5.27 |
| 15-19 | 3.47 | 3.22 |
| 20-24 | 4.13 | 2.24 |
| 25-29 | 3.54 | 3.20 |
| 30-34 | 3.63 | 4.06 |
| 35-39 | 3.86 | 4.81 |
| 40-44 | 3.67 | 4.04 |
| 45-49 | 3.70 | 3.24 |
| 50-54 | 3.70 | 3.24 |
| 55-59 | 3.47 | 2.44 |

female (con't)

| | | |
|--------------------|------|------|
| 60-64 | 2.52 | 1.43 |
| 65-69 | 2.05 | 1.14 |
| 70-74 | 1.51 | 0.85 |
| 75-79 | 0.99 | 0.59 |
| 80-84 | 0.55 | 0.36 |
| 85 years and older | 0.37 | 0.25 |

III. family income

| | | |
|--------------------------|--------|-------|
| total number of families | 173695 | 85272 |
| % of all families: | | |
| under \$1000 | 3.99 | 1.59 |
| \$1000-1999 | 5.92 | 1.65 |
| \$2000-2999 | 7.96 | 2.31 |
| \$3000-3999 | 10.61 | 3.39 |
| \$4000-4999 | 11.92 | 4.96 |
| \$5000-5999 | 10.15 | 6.96 |
| \$6000-6999 | 8.72 | 8.24 |
| \$7000-7999 | 7.44 | 9.27 |
| \$8000-8999 | 6.69 | 9.06 |
| \$9000-9999 | 5.51 | 7.93 |
| \$10000-14999 | 13.69 | 28.28 |
| \$15000-24999 | 5.65 | 12.25 |
| \$25000 and over | 2.38 | 4.04 |

IV. household size

| | | |
|--------------------------------|--------|-------|
| total number of occupied units | 252066 | 92433 |
| % of total occupied units: | | |
| 1 person | 27.32 | 6.70 |
| 2 | 28.42 | 22.61 |
| 3 | 15.56 | 19.65 |
| 4 | 11.40 | 23.54 |
| 5 | 7.14 | 15.05 |
| 6 persons and more | 10.05 | 12.50 |

V. dwelling size

| | |
|-----------------------|-------|
| % dwellings of 1 room | .51 |
| 2 rooms | 1.25 |
| 3 rooms | 7.62 |
| 4 rooms | 13.09 |
| 5 rooms | 16.69 |
| 6 rooms | 26.51 |
| 7 rooms | 17.54 |
| 8 rooms or more | 16.79 |

Space - Volume A

Characteristics

Low space - floor to ceiling 10'.
Depth not more than 30' from external surface.
Access to natural light and air and view is mandatory.
Small live loads.
Small span structural system.
Space highly fragmented both externally and internally.

Typical Uses

Dwelling.
Hotel Room.
Hospital or nursing ward.

Space - Volume B

Characteristics

Floor to ceiling 12' - 15'
Depth 30' - 40' from exterior surface
Natural light, air and view desirable
High degree of environmental control
Medium span structural systems (30' x 30')
High degree of flexibility allowing for rearrangements

Typical Uses

Elementary School
Junior High School
College
Technical Institute
Library

The Given Conditions:

I. Existing Extensive Land Use:

- a. dairy farming function - is currently being abandoned - soil is thin with potential trouble from erosion. This use may cover some 60% of the land.
- b. woodland - typical second or third growth hardwood.

II. Future Principal Uses:

- a. Satellite Town (year 2,000 - 85,000 population).
- b. Green Belts:
 - * 1. Great Seneca State Park. (4-5 thousand acres)
 - * 2. Little Seneca State Park.

III. Certain Specific Existing Uses:

- a. National Headquarters, Atomic Energy Commission.
- b. National Headquarters, Bureau of Standards.
- c. Fairchild Research Plant.
- d. Existing Germantown Village.
- e. Nearby Montgomery Village

IV. Existing or Imminent Utilities:

- a. electricity.
- b. water.
- c. sewage.

V. Expected Population Characteristics:

- a. The dominant portion of the population is expected to be high income due to the nature of the employment of the surrounding area. Specifically in reference to what he thought to be high income, Mr. Conway expects the average income to be greater than \$13,000 per anum.

* These state parks in all likelihood will include extensive artificial lakes.

(Expected Population Characteristics Con't)

- b. Commission plan at present expects to include low and middle income groups as well, but does not foresee that they will be greater than 5 to 10% of the total population. This low and middle income group is expected to form service functions in the community.

VI. Employment Characteristics:

- a. In the year 2,000 a total of 30,000 jobs expected of which 10,000 non-basic or service jobs. They expect a 2 to 1 ratio of non-basic to basic to be fairly solid.

It is expected that a considerable portion of the 30,000 jobs will be carried out by people outside of the Satellite Town commuting to and from. It is also expected that the residents of the town will, to a significant degree, commute to jobs outside of the town.

- b. Some special employers either present or to be expected:
 - 1. The National Atomic Energy Commission (2500 employees)
 - 2. The National Bureau of Standards (5,000 to 7,000 employees)
 - 3. Fairchild Inc. (500 to 700 employees)
 - 4. Industrial Area neighborhood Fairchild expect jobs to occur on a ratio of 23 workers per acre.

DESIGN PROPOSAL

Regional Location

This is located in the heart of the fastest-growing metropolitan area in the country.

It is expected to add 4 million people to the region in the next 25 years.

The year 2000 Plan for Washington, D. C. establishes Germantown as one of the corridor cities with critical ties to Washington, D. C. and secondary ties to Baltimore. This plan calls for a series of new urban developments radiating from Washington, D. C.

The city is located 20 miles northwest of Washington, D. C. The next new town on this leg is Clarksburg. The dominant communication links with Washington are Route 70 S and B and O RR. In addition to these links, I am advocating rapid transit lines to link the town with Washington. This transit will use the B and O RR right-of-way until the point it enters Germantown and continues to Clarksburg.

Site

The major geographical characteristics of the site are a rolling countryside, two major water runs (Little and Big Seneca Creaks), and a considerable amount of foliage. The Little Seneca Creak provided means for me to create a handsome body of water in close proximity to the city. The nearness of Route 70 S to the north of my site provided easy access to the city and also gave passers-by the opportunity to view the city-scape.

The B and O RR provided the necessary roads for industry and goods to be delivered to and from the city. In the immediate vicinity are located the Atomic Energy Commission and the Fairchild Hillar Corporation. Both have anticipated growth in the near future which, in turn, will help the growth of the city.

Conceptual Organization

It is a linear concept of incremental growth. The major spine is parallel to the main vehicular route and transit line.

The major texture of the city is determined by the spine and the density of the housing. This housing is an integral part of the spine, and also releases itself on the surrounding area. It grows to the water edge and grows to the wooded areas which are bountiful on the site.

The first plan shows the vehicular routes which serve the spine. This spine contains all the city's functions and it is only a few steps from the residences. Some of the major contributors of space in the spine are a regional shopping center, government office space and educational facilities. The parking is primarily below the spine as it is the central storage area. Access to this service level is provided within the framework of the vehicular set up. This eliminates trucks from the major automobile route. From this service level, goods are distributed to local storage areas as required. Also at

this level, this plan shows how the rapid transit enters the matrix of the city spine and also how the people make the transition to and from this transportation device. At this level also is shown how the residential motor routes are integrated into the spine. Occurring along these residential streets are parking emergency access and service cul-de-sacs.

The next drawing shows the pedestrian area, its relationship to the living matrix and in turn to the spinal development. Integrated into these pedestrian paths or minor city corridors are primary schools, local service facilities, churches, recreation, etc.

The educational complexes are located at essential points of the site.

The industrial part is located in close proximity to the spine and at the same time is segregated enough to adjacent close residences.

The fifth drawing shows the general city plan and I have tried to show the general character of the city texture and how it relates to the spinal growth pattern and this site.

Housing

Three lanes, one-way road is the main access to the complex.

Sufficient entries to and exits from parking garages are provided from the main road.

The parking structure which is 30 feet bay is laying right on the ground and conditioned by the topography.

One service road on each level runs along the whole parking and is connected to the entries and exits.

On the roof of the parking garages which is a continuous series of generous platforms enabled me to use groups of shops, restaurants, cafes, offices, schools, etc. to mold and divide the space to more characterized smaller spaces.

From the ground up to above the activities happening on the ground is the space most convenient for housing where each individual unit could share natural light, sun, view and others and all the conveniences and services supported by the community.

Structural System Chosen as a Means of Providing:

Ability to lift housing into the sky free from the ground with a minimum amount of supporting structure to hinder flexibility of organizing ground level construction.

Tension system minimizes super structure, supporting and suspension elements, concentrates foundations.

Combined system of rigid frames and tension structure enables freedom for growth and change in the total housing system. Individuals buy space and services with the frame and build dwelling with prefabricated panelized components.

Housing organization enables people to manipulate their environment, enlarge it, provide open spaces such as terraces and balconies, change it to their desires and needs.

Housing can be suspended above shopping, parking, and work spaces acting as cover and forming a finite spacial environment in the city enhancing its uniqueness and creating an existing urban experience. Where appropriate housing supported on conventional systems could grow up and meet suspended housing. This gradual movement from the ground to high in the sky provides a different living experience.

Photographs

Model 1" = 200'

Location Plan--Section 1" = 50'

Circulation of Vehicle and Parking 1" = 200"

Pedestrian Level 1' = 200"

Roof Plan 1" = 200"

General Sectional Plan 1" = 50'

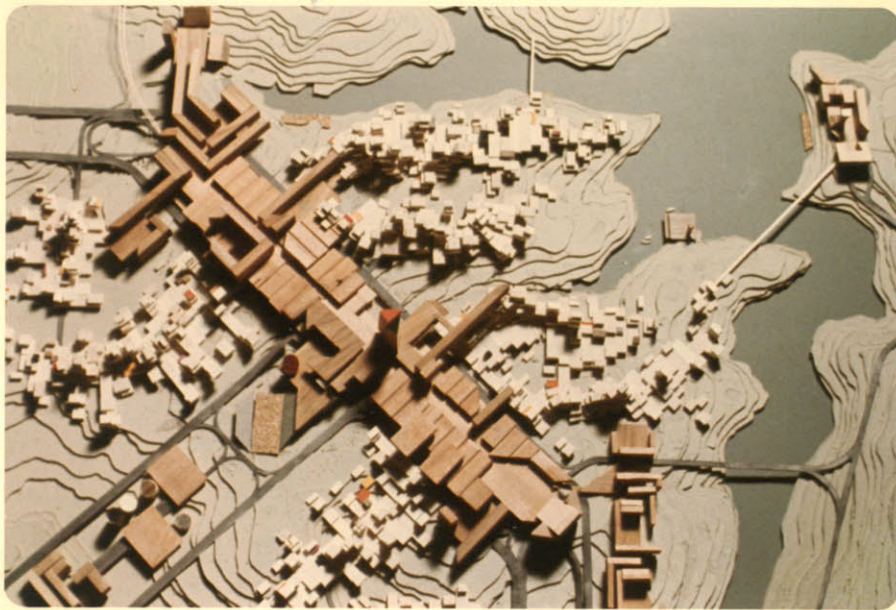
Sectional Plan EE--Elevation 1" = 32'

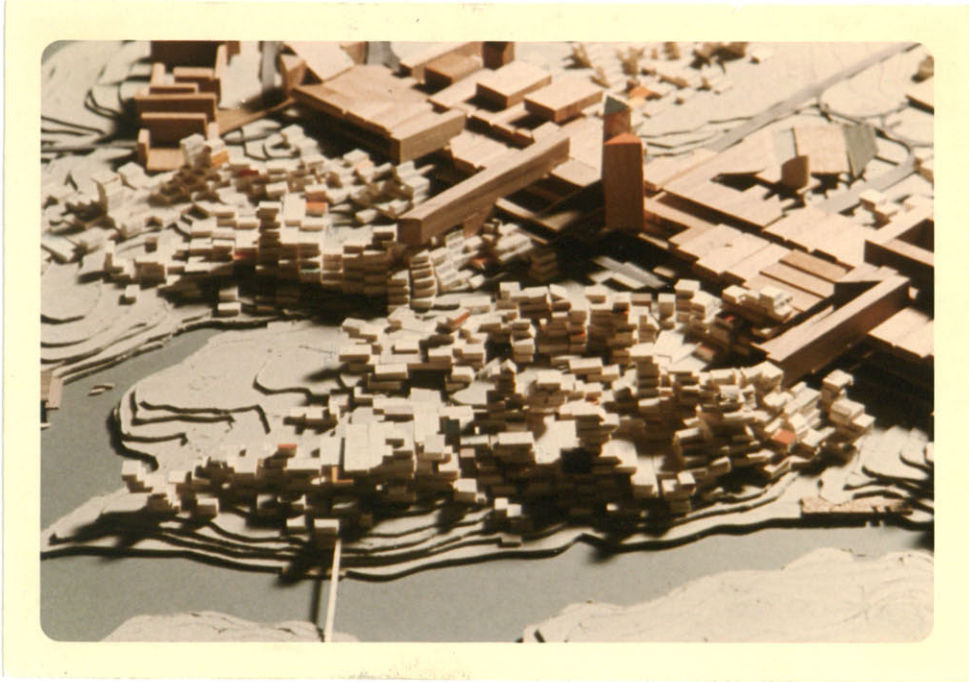
Sectional Plan BB--Section 1" = 32'

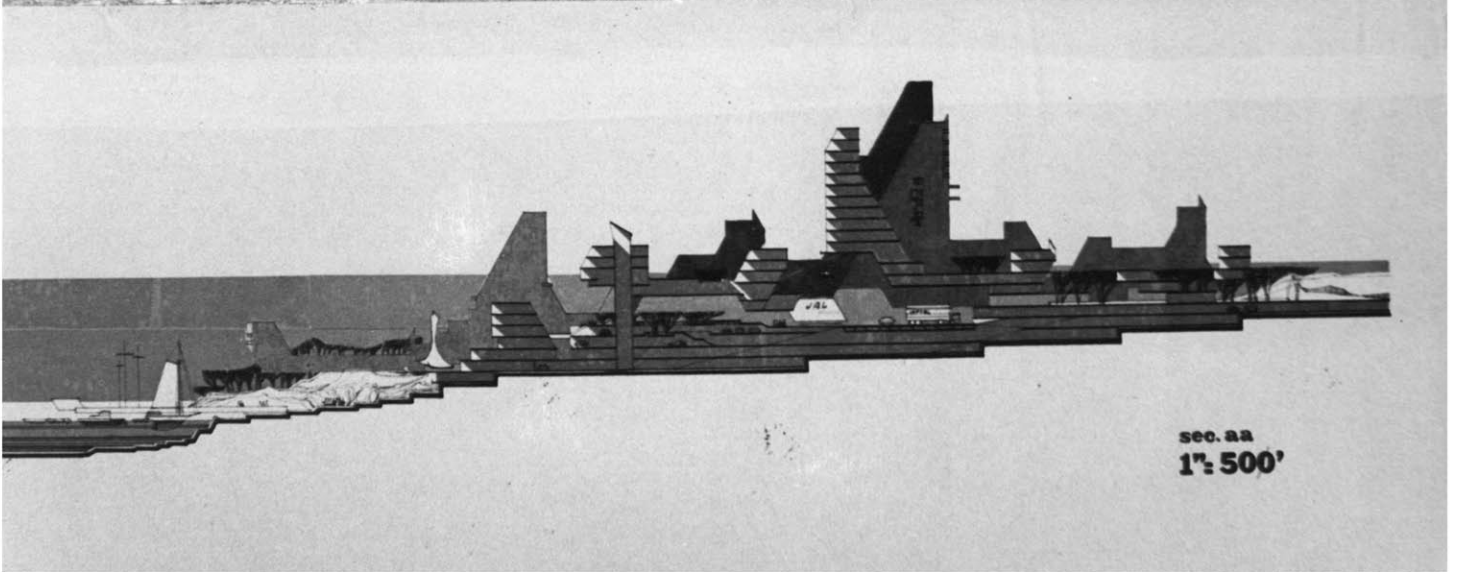
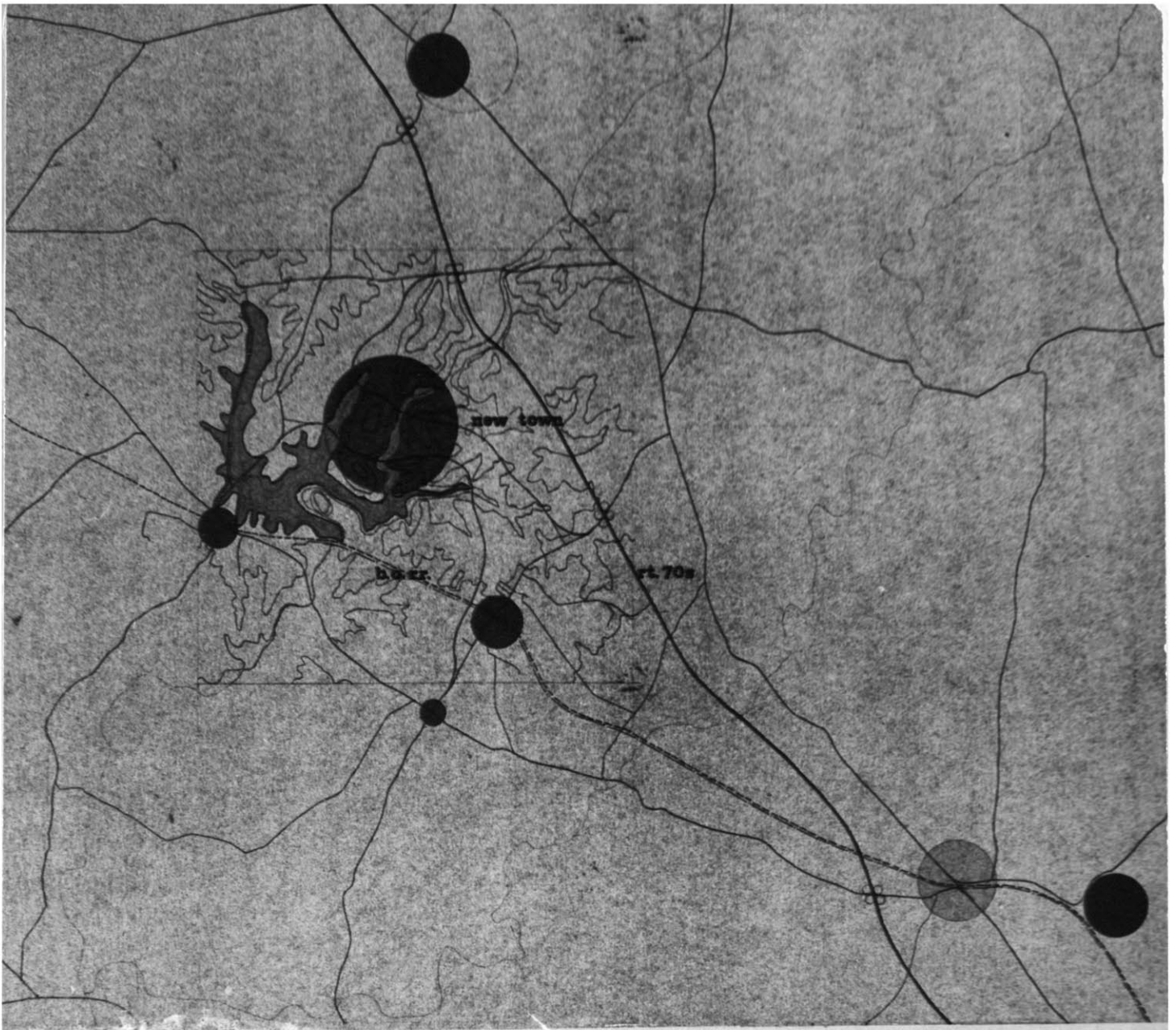
Sectional Plan AA--Construction 1" = 32'

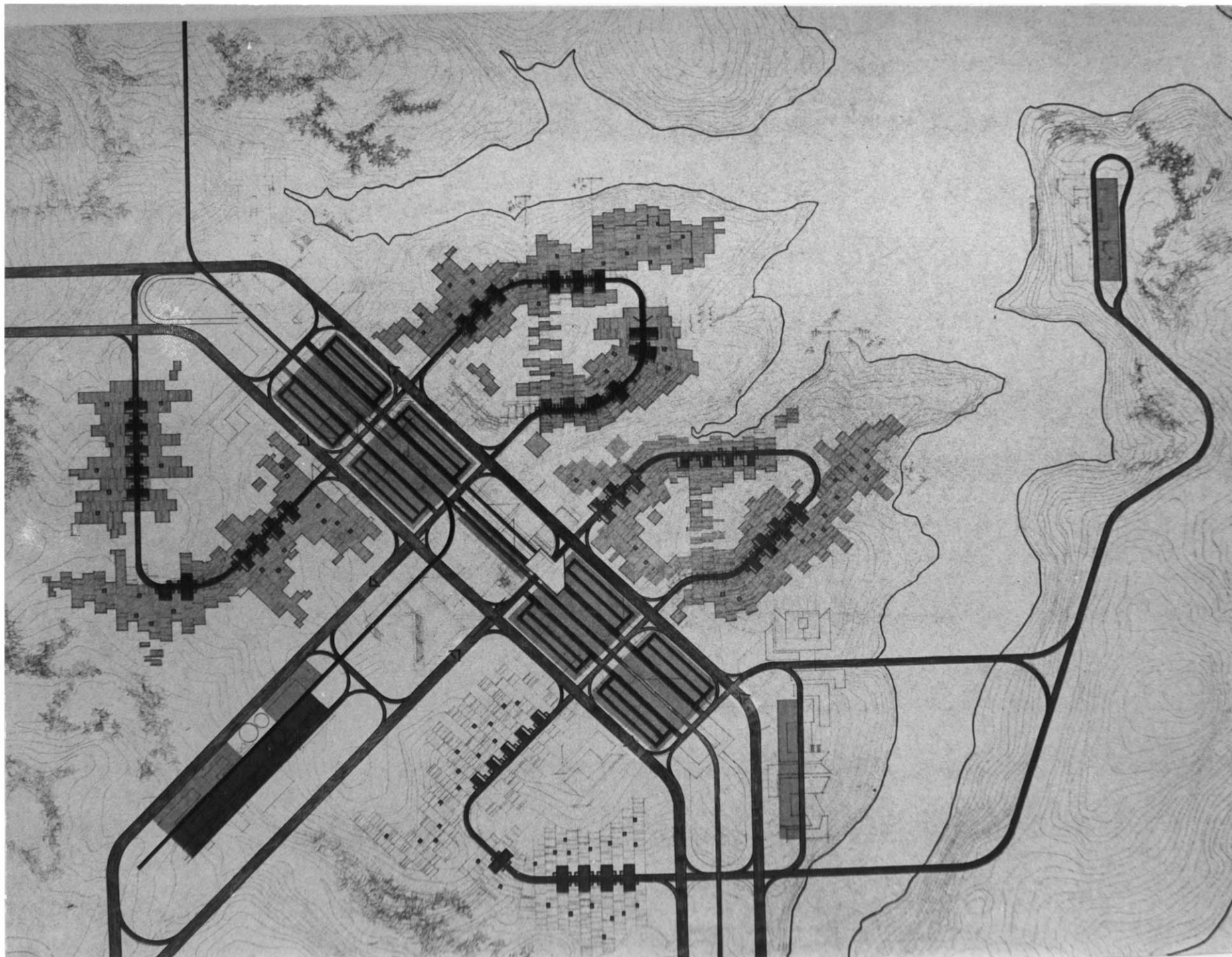
Structure Plan Section--Plan 1" = 32'

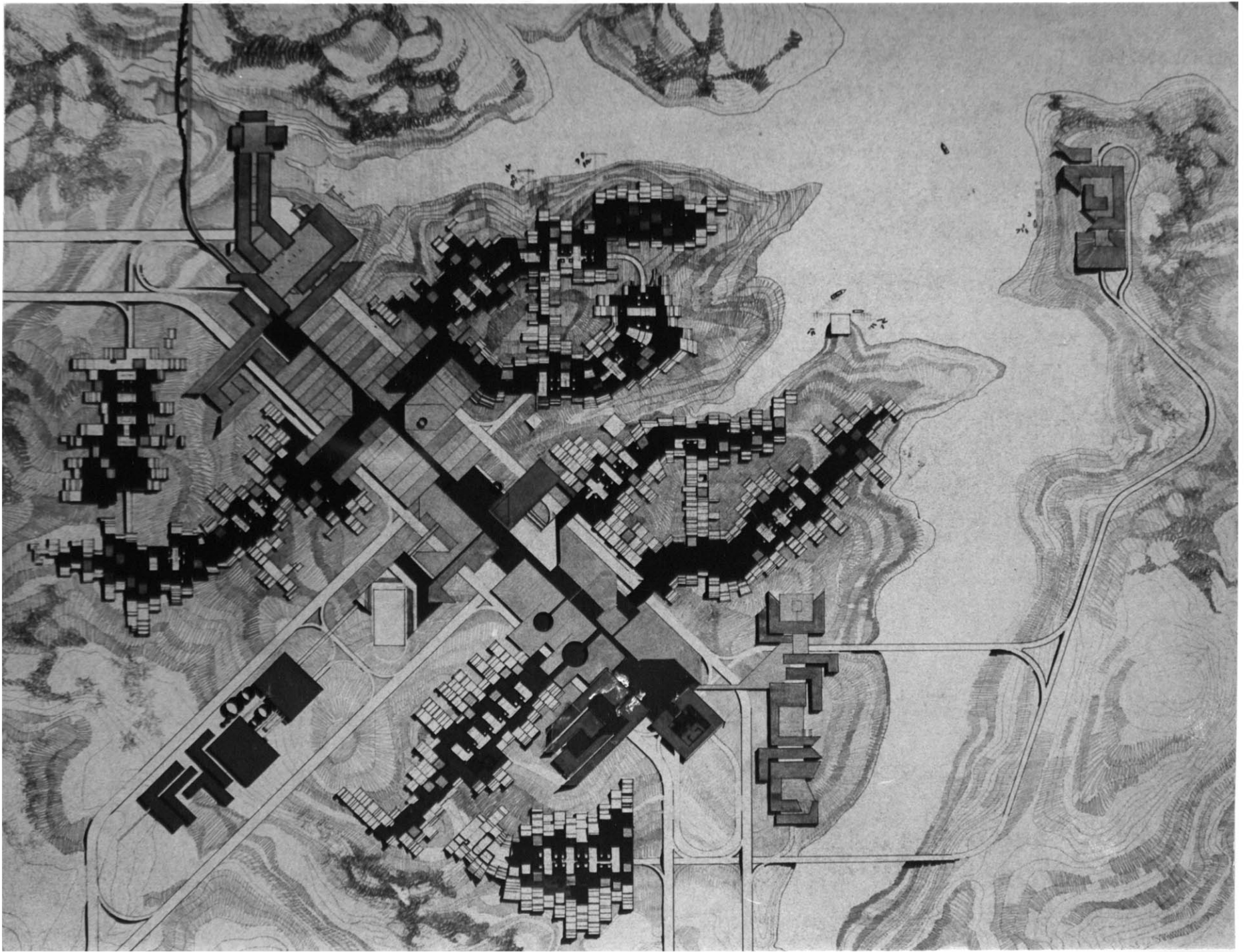
Model 1" = 16'

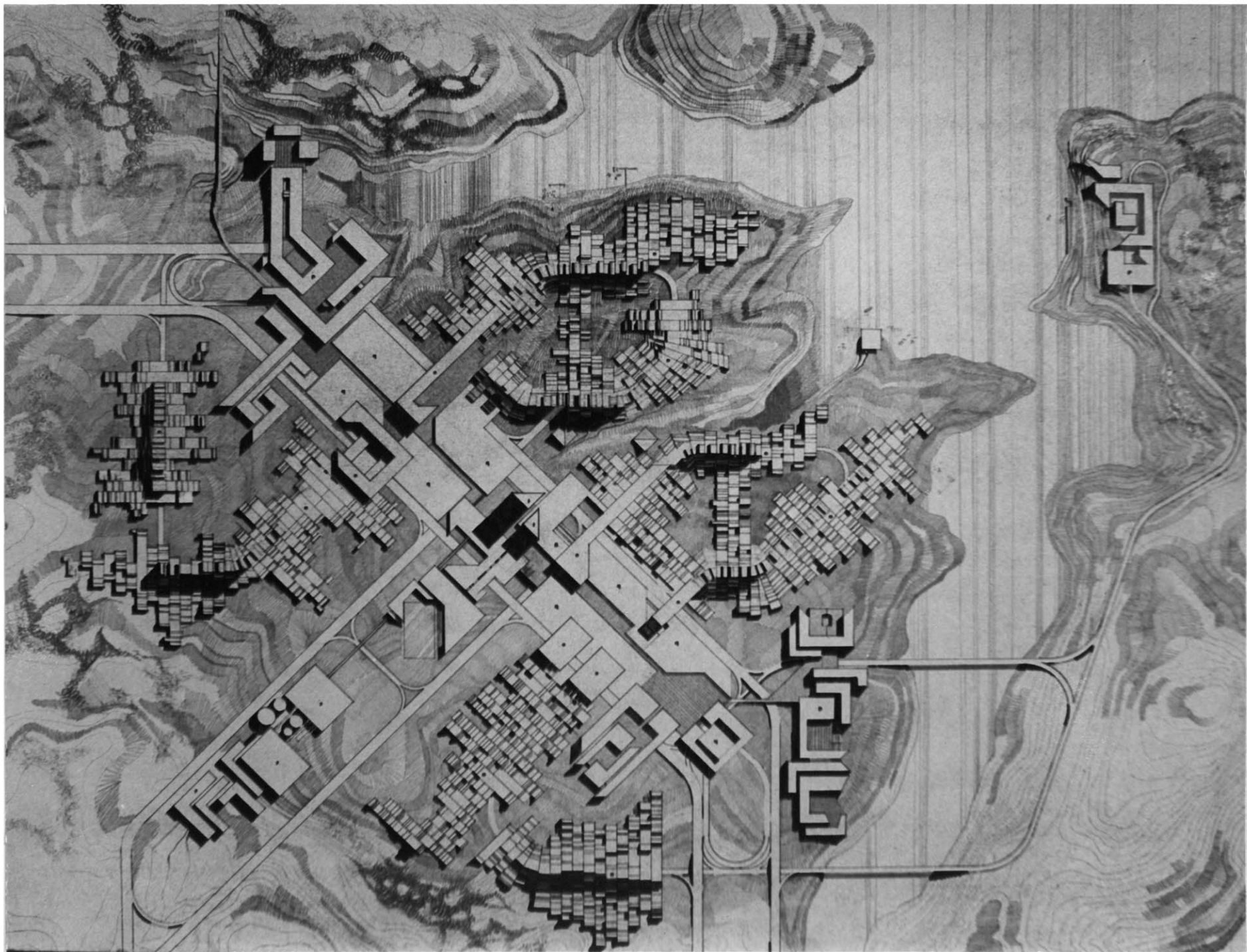


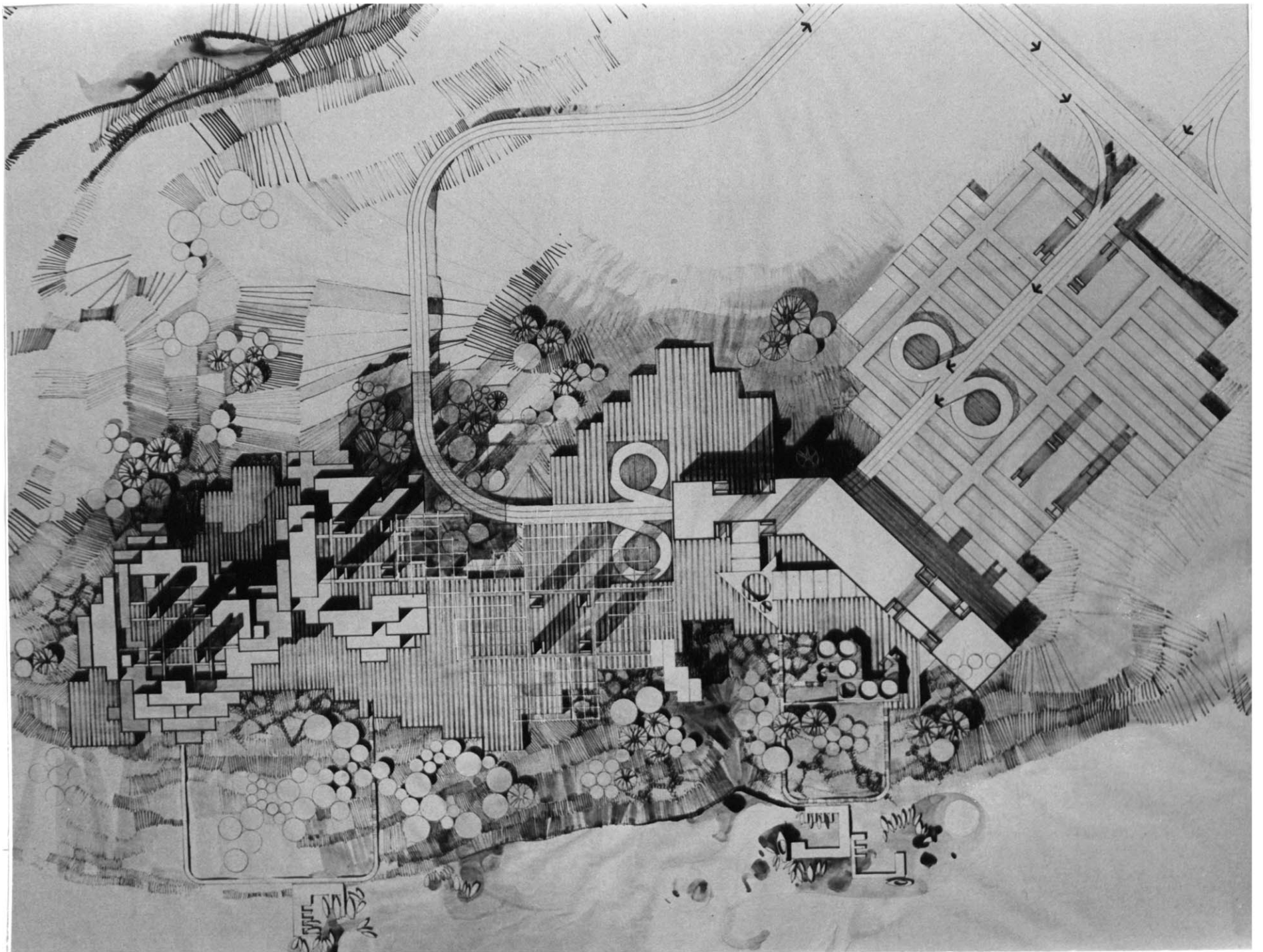


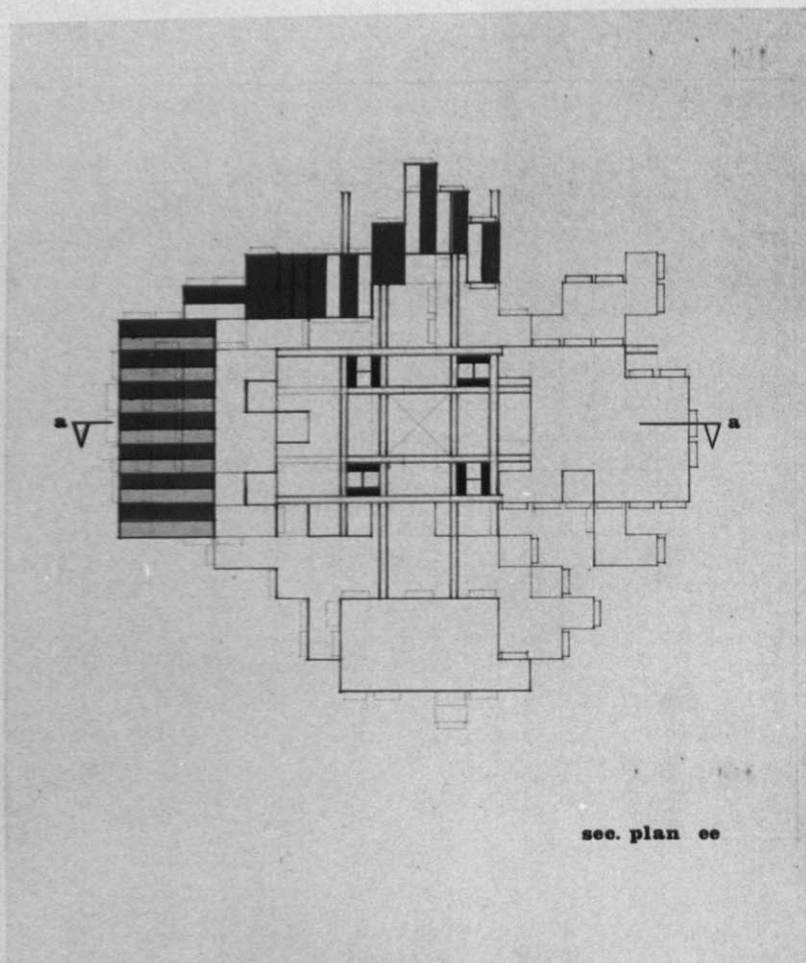




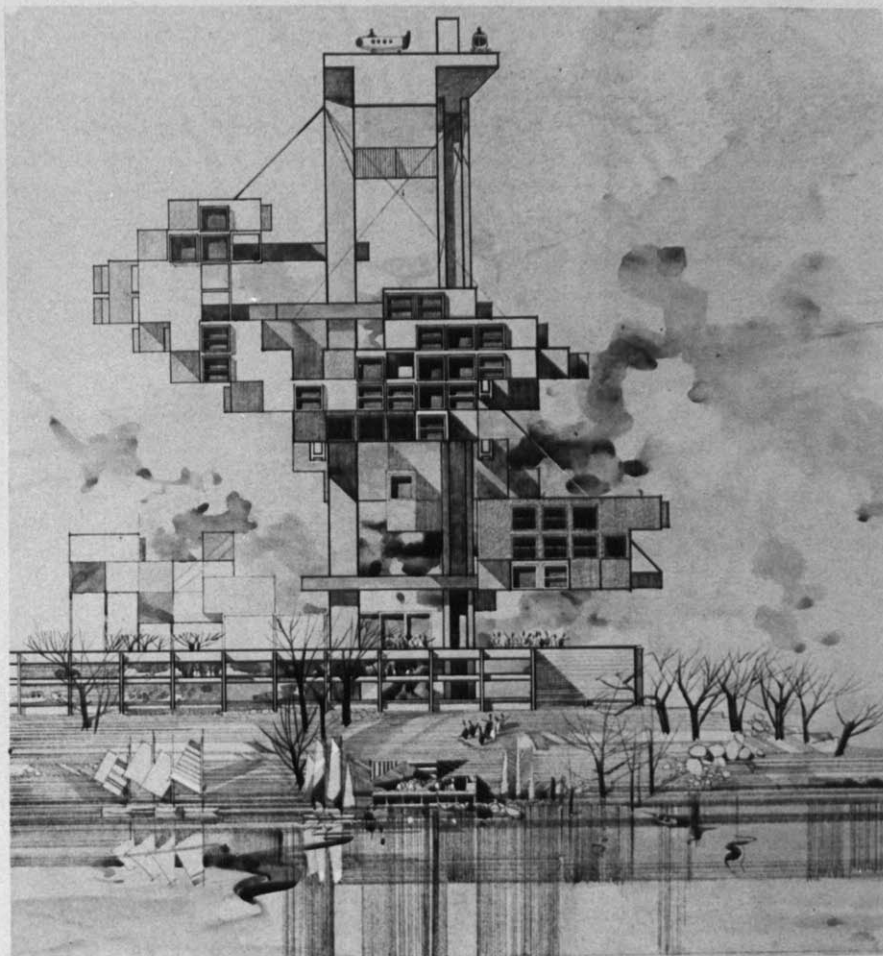




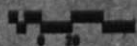




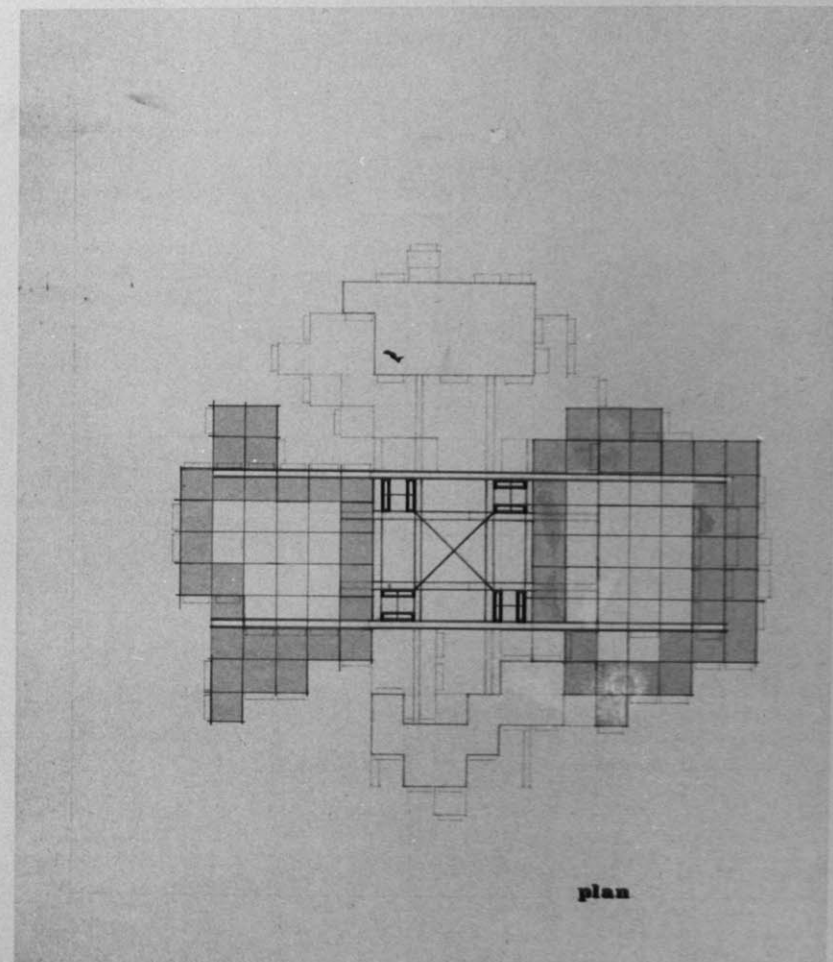
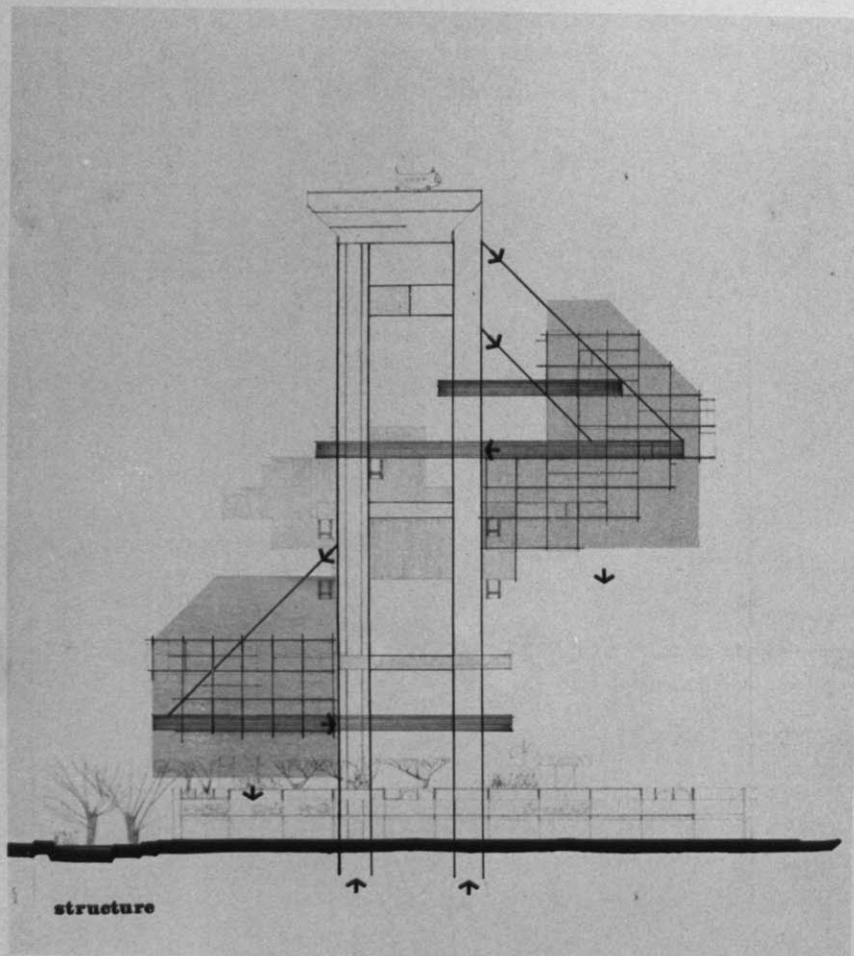
sec. plan ee



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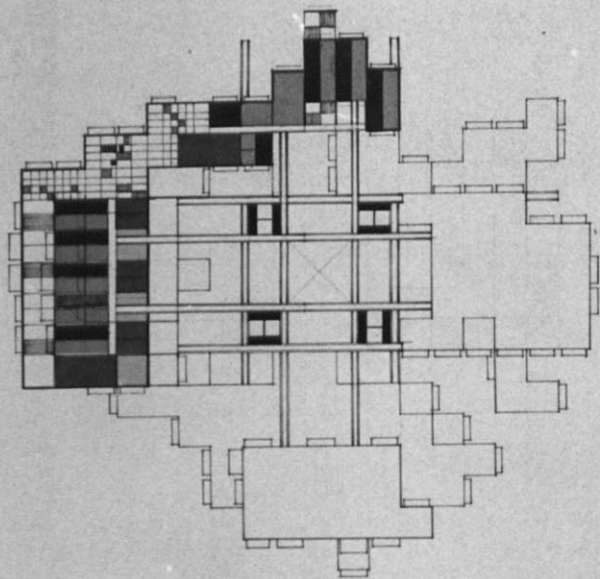
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 massachusetts institute of technology
 january, 1968
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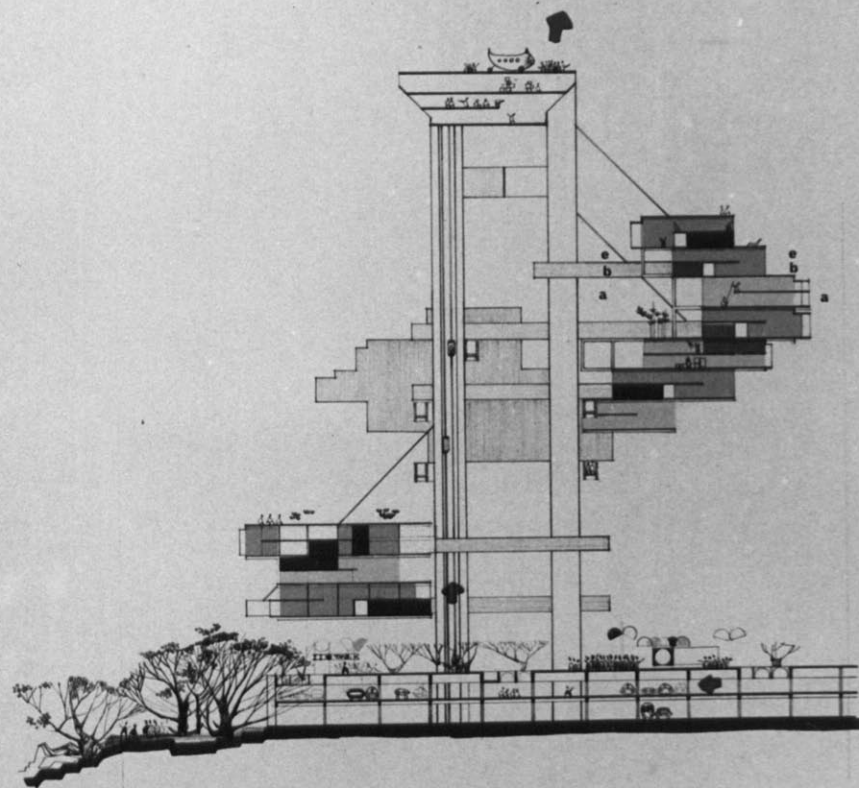
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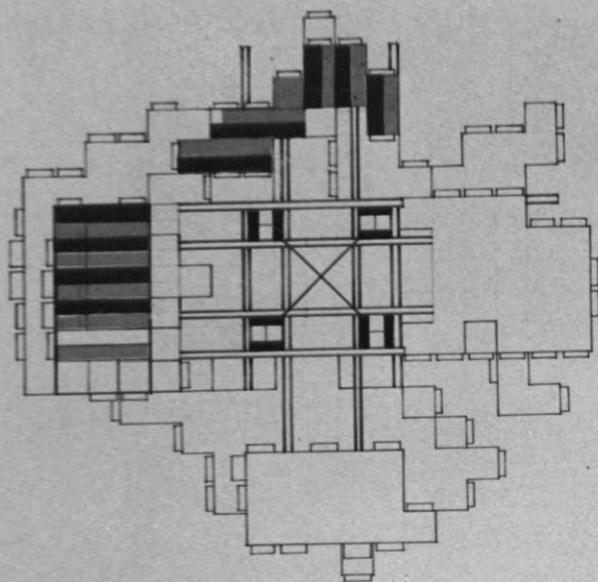


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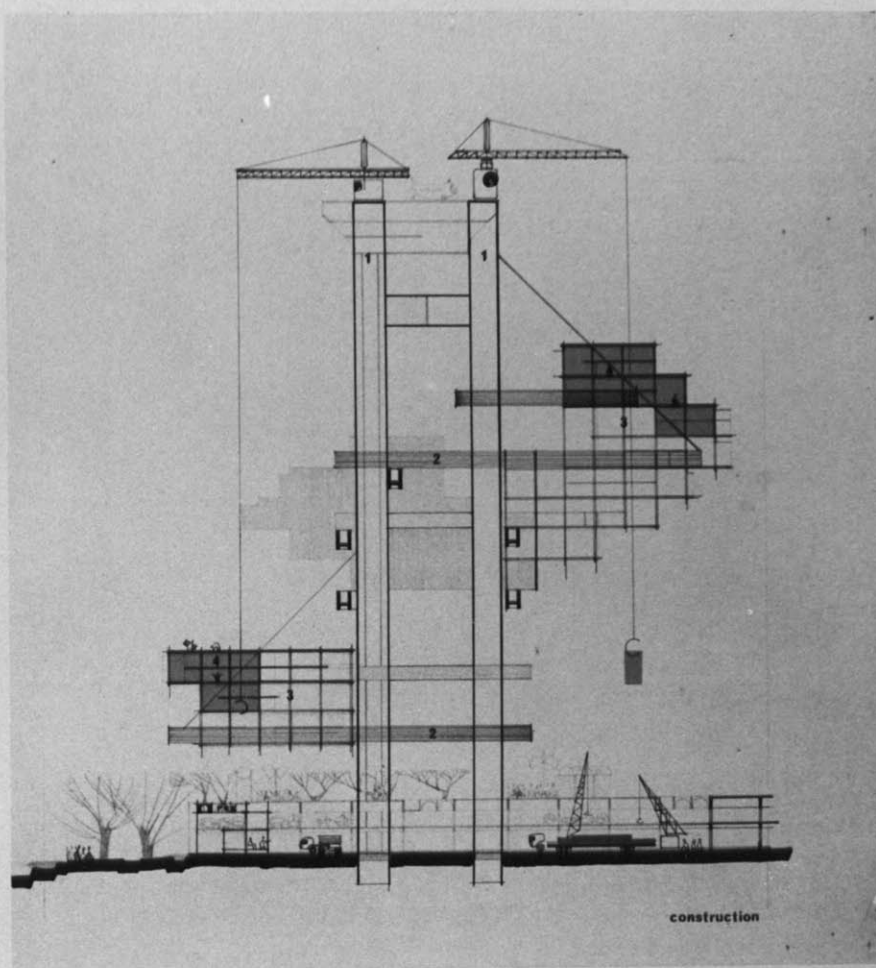
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construction

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